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Income inequality, decentralisation and regional development in Western Europe

by

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Abstract

This paper deals with the relationship between decentralisation, regional economic development, and income inequality within regions. Using multiplicative interaction models and regionally aggregated microeconomic data for more than 100,000 individuals in the European Union (EU), it addresses two main questions. First, whether fiscal and political decentralisation in Western Europe has an effect on within regional interpersonal inequality. Second, whether this potential relationship is mediated by the level of economic development of the region. The results of the analysis show that greater fiscal decentralisation is associated with lower interpersonal income inequality, but as regional income rises, further decentralisation is connected to a lower decrease in inequality. This finding is robust to the measurement and definition of income inequality, as well as to the weighting of the spatial units by their population size.

Keywords: Income inequality, income per capita, fiscal and political decentralisation, interaction, regions, Europe

1. Introduction

There has been no shortage of interest on the economic implications of the transfer of power and resources to lower tiers of government. The overwhelming majority of the analyses which have tackled these issues have been macro-approaches. They have been concerned with the impact of decentralisation on territories – mainly regions and countries. As a consequence, the potential effects of political and fiscal decentralisation on both regional and national economic growth (Davoodi and Zou 1998; Zhang and Zou 2001; Thießen 2003; Rodríguez-Pose and Bwire 2004; Iimi 2005; Dabla-Norris 2006; Rodríguez-Pose and Ezcurra 2011) and on interregional inequalities (Canaleta *et al.* 2004; Rodriguez-Pose and Gill 2004; Ezcurra and Pascual 2008; Lessmann 2009; Rodríguez-Pose and Ezcurra 2010) have been thoroughly scrutinized. There has been, however, much less interest on the potential influence of decentralisation on interpersonal inequalities using microeconomic data. The impact of decentralisation on income distribution has been almost completely overlooked by the literature. Neyapti (2006), Morelli and Seaman (2007) and Sepúlveda and Martínez-Vázquez (2011) represent the only exception. Hence our knowledge about the influence, if at all, of decentralisation processes on interpersonal inequalities is extremely limited and patchy.

This paper aims to cover this gap in the literature by exploring the relationship between fiscal and political decentralisation, regional economic development, and within-regional income inequality in the European Union (EU) using regionally aggregated microeconomic data for more than 100,000 individuals. It addresses the questions of whether (a) decentralisation in Western Europe has an effect on within regional interpersonal inequality and whether (b) this relationship is mediated by the level of economic development of the region.[1] In answering this question, the paper makes four contributions to the field. First, it looks at the black box of the income distribution

[1] This paper examines income distribution among individuals rather than among households because, following the arguments of Kuznets and Gallman (1989), it makes little sense to talk about income inequality among households, as the sizes of the underlying units vary significantly (see Peracchi 2002). Concentrating on individual rather than on household income allows to abstract income data from changes in patterns of household formation. Moreover, the paper addresses income, not wage, distribution, because we are interested in the distribution of wealth, regardless of whether wealth results from the accumulation of labour earnings or capital income. We consider income distribution not only for the population as a whole, but also for normally working people (i.e.: those who work 15 hours per week or more).

implications of the decentralisation processes which have been common across Europe over the last three decades (Hooghe *et al.* 2008). Second, it finds that fiscal decentralisation matters for interpersonal inequality across the regions of Europe. Third, it shows that this relationship is affected by the level of development of the region. And, finally, it sheds light on the governance arrangements that are most appropriate for developing and delivering equity.

The paper uses multiplicative interaction models to examine whether regional per-capita income intervenes in the relationship between fiscal and political decentralisation and income inequality within regions. In other words, we examine whether the magnitude of this relation varies across different development levels.

The paper is organised as follows. In the next section, we discuss the potential association between fiscal and political decentralisation and income inequality within regions from a theoretical perspective and how this association may vary at different levels of regional economic development. Section 3 introduces the empirical model and presents the data, the variables, and some descriptive statistics. Section 4 is devoted to the results which arise from the multiplicative interaction models. The final section concludes, discusses some potential limitations, and draws some implications for policy.

2. Decentralisation, income inequality and level of development

2.1 Decentralisation and income inequality

The economic case for local authorities and regional autonomy has often been built on efficiency and equity grounds. From an efficiency perspective, persistent interregional inequalities are bound to be inefficient at the national level. The underutilisation and underperformance of workers and productive capacity in lagging regions lowers overall national wealth. From an equity perspective, persistent income inequality systematically disadvantages individuals, creating a raft of economic, social, and political problems (see Martin 2008). While excessive interpersonal inequality has potentially pernicious economic effects, in a healthily functioning economy a degree of income inequality is also generally conceived to create incentives for achievement, productivity and innovation (Rodríguez-Pose and Tselios 2009a). The relative weight between equity and

efficiency depends on the political strategy of local authorities and central government. More market-oriented parties are more likely to promote policies that would increase efficiency even at the expense of greater inequality, while less market-oriented parties would tend to give greater priority to the balance between efficiency and equity. Moreover, local authorities may award more relevance to local economic growth, with less concern for a nation-wide efficient allocation of productivity resources. This could, in turn, contribute to a decrease in interregional income inequality, but perhaps not intraregional inequalities. Although this paper investigates the relationship between equity and decentralisation, equity and efficiency are not necessarily unrelated and can be considered complimentary (Martin 2008).

But what do we know about how decentralisation affects – if at all – interpersonal inequality within a region and/or a country? The studies which have dealt with this question so far reach contradictory results. Morelli and Seaman (2007) highlight that, in the case of the UK, decentralisation has been harmful for interpersonal inequality, although the factors behind this relationship are not clear. Neyapti (2006) also shows that revenue decentralisation in 54 countries has led to increased inequality, although the impact has been less damaging in countries with good governance levels. By contrast, Sepúlveda and Martínez-Vazquez (2011), using panel data analysis for 34 countries, reach the conclusion that decentralisation seems to reduce income inequalities in those cases where the national government still represents a significant share of the economy. There is thus little that can be extracted from existing empirical literature. Theoretical studies about decentralisation provide no further insights. Although interregional and interpersonal inequalities are not unrelated (Kanbur and Venables 2005), a spawning literature on fiscal federalism has been concerned with the influence of decentralisation and its changes on territories, but has shown relatively little interest on the implications for individuals.

Transfers of powers and resources to lower tiers of government can be envisaged – under different circumstances and in different contexts – to contribute to increase or reduce interpersonal inequalities (e.g. Tiebout 1956; Musgrave 1959; Oates 1972; Pauly 1973; Brown and Oates 1987).

One of the reasons why decentralisation may foster a decline in interpersonal inequalities is related to the main fiscal federalism theorem. Decentralising government is often considered to increase the degree of efficiency in the allocation of resources and to allow for utility-maximizing behaviour by public agents. This is because subnational governments are likely to have an information advantage over central governments when it comes to responding to the needs and preferences of local citizens (Tiebout 1956; Oates 1972; Ezcurra and Pascual 2008). Greater transfers of powers and resources to local and regional governments, especially if in response to bottom-up regional demands, can thus promote a better matching of public policies to local needs (Rodríguez-Pose *et al.* 2009). If local interpersonal inequalities are perceived to be an important issue, then they can be more efficiently tackled at a local or regional than at a national scale, because local decision-makers and public officials may respond better and more efficiently to the desires of their constituents, and subnational governments may be better able to match differing preferences across and within jurisdictions (Tiebout 1956).

Another argument which highlights the positive relationship between decentralisation and equity is that decentralisation brings government closer to the people, increasing social capital, making local officials not just better informed about local needs, strengths, and weaknesses, but also better able to set the optimal mix of local policies than bureaucrats in distant central governments (Lessmann 2009; de Mello 2011). Decentralisation is also considered to bring further benefits by promoting greater voice, transparency, accountability, and participation. The creation of opportunities for voice and participation tends to weaken the hold of local elites and empowers under-represented groups in society, including the poor, those less well-off, and local marginal groups. Such empowerment may to lead to the creation of new local forms of governance and to the adoption of policies involving a wider range of actors and thus more sensitive to the presence of poverty and interpersonal inequalities (Le Galès 2002; Brenner 2004). Finally, greater transparency and accountability limit the opportunities for corruption, once again reducing the risk of a small privileged group capturing the returns of public policies and contributing to a further reduction in local interpersonal inequality (Weingast 2009).

But while there are certain reasons why decentralisation may be regarded as an inequality-reducing force, there are almost as many reasons which push in the opposite direction. First, decentralisation weakens the capacity of central government to play an equalizing role through social and territorial transfers. This fundamentally affects the capacity of the state to achieve a more balanced distribution of income by channelling resources from the rich to the poor. And while this task may be undertaken by subnational governments, it is often the case that subnational governments, especially in the poorer regions of less developed countries, lack the resources and capacity of the nation-state to address income inequalities. Hence, some fiscal federalists argue that the central government should have the basic responsibility for the macroeconomic stabilization function and for income redistribution in the form of assistance to the poor (Oates 1999: 1121). Capacity constraints may also play a role in leading to greater interpersonal income inequality in decentralised contexts. Subnational governments, because they are likely to attract less skilled and capable officials and decision-makers (Prud'homme 1995), can end up being less efficient at delivering all kinds of policies. This may be particularly poignant in cases where interterritorial disparities are significant and where local governments in the poorest and more unequal regions may lack both the capacity and resources to tackle inequality as effectively as a more centralized government. In addition, if local vested interests are powerful, in the absence of strong local accountability – a situation most likely to happen in less developed and less equal territories – decentralisation could increase social fragmentation and inequality (Blanchard and Shleifer 2001; Bardhan and Mookherjee 2006; Neyapti 2006). It can therefore be assumed that the decentralisation-inequality relationship is thus strongly moderated by the quality of governance of a country (Neyapti 2006; Kyriacou and Roca-Sagalés 2011).

Overall, it can be envisaged that decentralisation may increase efficiency when heterogeneous preferences exist (Pauly 1973). Those regions which prefer higher interpersonal redistribution may chose a tax-transfer scheme with high redistribution (e.g. more progressive), while regions with low preferences for redistribution may chose lower transfers. This may enhance equity only if there is no cross-border mobility and thus interpersonal redistribution within a region will increase the mobility of potential

recipients and of potential donor-tax payers. If, by contrast, interregional mobility is costless, this may lead to a greater mobility of potential recipients and potential donor-tax payers.

2.2 The role of development: rich versus poor regions

The above sub-section underlines that whether decentralisation is good or bad for equity is highly contingent on the level of development of a territory. There are several reasons for this. First of all, it is widely known that poor regions face greater budget constraints than richer ones. Intergovernmental grants, which tend to focus on equity considerations, usually constitute the main source of local revenues to poor regions creating an environment of 'transfer dependency' (Oates 2008). Greater decentralisation tends to curtail this flow of funds from central government to regions and localities, disrupting the equalisation flow from richer to poorer areas. Hence, subnational governments in less well-off areas may end up with inadequate sources of revenue to tackle local inequality, meaning that they can never truly enjoy fiscal autonomy (Weingast 2009). In contrast, the greater capacity of richer local and regional authorities to rely on their own revenues entails that they are often in a better shape to address inequality problems. There thus seems to be a 'threshold level of economic development' at which fiscal decentralisation becomes attractive (Oates 2008) and more likely to deliver a reduction in inequality. Hence, poorer areas may have a lower capacity to deliver greater interpersonal equality and may often generate incentives for migration (Pauly 1973).

By contrast, when there are strong inefficiencies within a system and these are properly addressed by decentralisation processes, efficiency gains may be greater in those areas where the inefficiencies were originally larger (Rodríguez-Pose and Ezcurra 2010). Consequently, if the efficiency gains are put to good use, interpersonal inequality would decrease faster in less developed than in more developed areas, although large institutional and capacity constraints may operate in an opposite direction.

This quick look at the theory has revealed that, first, we know rather little about the potential implications of decentralisation trends for interpersonal inequality and, second, that the potential factors at play can derive either in greater or in lower inequality. The relationship is also likely to be influenced by the level of development of a region or a

locality. Hence the questions of whether decentralisation has an effect on within regional interpersonal inequality and whether this possible relationship is mediated by the level of economic development of the region remain open and have to be addressed from an empirical perspective.

3. Econometric specification, data and variables

3.1 Econometric specification: detecting interactions

These are precisely the questions driving this paper. Does decentralisation affect interpersonal inequality across the regions of Western Europe? And, is this relationship contingent on a region's level of development? Or, in other words, does decentralisation affect interpersonal inequality in core and lagging regions differently? In order to answer these questions we build an econometric specification based upon the theoretical approach and empirical applications described in the previous section. Our econometric specification is based on panel data analysis in order to minimise potential problems of omitted variable bias, to increase degrees of freedom, and to improve the accuracy of the parameter estimates (i.e. Wooldridge 2002; Greene 2003; Baltagi 2005). In our multiplicative interaction model, income inequality within regions is determined according to the following equation.

$$IncIneq_{it} = \alpha + \beta_1 IncPC_{it} + \beta_2 FD_{st} + \beta_3 PD_{st} + \beta_4 TO_{st} + \beta_5 PS_{st} + \beta_6 FD_{st} IncPC_{it} + \\ + \beta_7 PD_{st} IncPC_{it} + \beta_8 TO_{st} IncPC_{it} + \beta_9 PS_{st} IncPC_{it} + \gamma x_{it} + \nu_i + \phi_t + \varepsilon_{it}$$

where $IncIneq_{it}$ is the within-region income inequality for region i at time t, $IncPC_{it}$ is the regional per-capita income for region i at time t, FD_{st} is a proxy for the degree of fiscal decentralisation for country s at time t, PD_{st} is a proxy for the degree of political decentralisation for country s at time t.

The model also includes a series of control variables aimed at testing the role of other factors likely to moderate the decentralisation-inequality relationship. Most prominent among these control factors are TO_{st}, the trade openness for country s at time t, and PS_{st}, the public sector size for country s at time t. The reason for introducing trade openness in the analysis is the crucial role that interregional and international trade plays

on economic performance and consequently, on interpersonal inequality through a multitude of mechanisms such as capital mobility, labour migration, technological diffusion, and forward and backward linkages. Numerous theories (e.g. neoclassical trade theory, new trade theory, and the new economic geography theory) have stressed this relationship. More specifically, neoclassical trade theory argues that trade openness may result in a reduction of income inequality and in increases in economic development. According to Ricardian theory, as regions and countries specialise in the production of those goods they produce most efficiently and buy goods that they produce less efficiently from other regions and countries, benefits for both home and foreign economies are generated, thus reducing disparities and increasing welfare. In a Heckscher-Ohlin framework, the capital-abundant economies specialise in the production and export of capital-intensive goods, while the labour-abundant economies specialise in the production and export of labour-intensive goods, which implies that trade openness makes economies more prosperous and successful in the long run. New trade theory (Krugman 1980) and the new economic geography theory stress the existence of an inverted U relationship between trade cost and agglomeration. If there is relatively little trade (high trade cost or low trade openness), welfare is mainly determined by product market competition. For intermediate trade costs, centripetal forces outweigh centrifugal ones. Firms and workers cluster together as firms produce more efficiently and workers enjoy higher welfare by being close to large markets. Consequently, having an access advantage raises local factor prices, induces factor inflows, and increases the home market effect. For very low trade costs, the price of local factors tends to increase, enhancing factor market competition and reducing disparities. Nevertheless, the above predictions depend on the theoretical assumptions of each model (i.e. Krugman and Elizondo 1996).

Similarly, public sector size has a crucial role in the decentralisation-inequality relationship. Zax (1989) argues that if decentralisation encourages ‘competition’ among governments, the local public sector size shrinks, while if decentralisation sacrifices scale economies, the local public sector size expands. In other words, decentralisation, on the one hand, multiplies the public service bundles available to citizens through the propagation of government units which may promote ‘competition’ among governments,

efficient provision of local public services, and a smaller local public sector, all other things equal. On the other, it leads to smaller government units, but only if the production or administration of local public services is subject to scale economies (Zax 1989).

The other variables included in the model are as follows. x_{it} is a vector of regional-specific characteristics for region i at time t. By adding x_{it} we are able to capture the main structural and economic features of the regions of Western Europe and to take into account some important sources of regional heterogeneity (Sterlacchini 2008).

As we also want to test whether the relationship between fiscal and political decentralisation and inequality is contingent on the level of development of a region, we include a series of interaction variables between the key dependent variables and income per capita – taken as an imperfect proxy for the level of development of a region. These interactions are $FD_{st}IncPC_{it}$, $PD_{st}IncPC_{it}$, $TO_{st}IncPC_{it}$ and $PS_{st}IncPC_{it}$ which represent the interaction terms between fiscal decentralisation, political decentralisation, trade openness and public sector size with regional per-capita income, respectively. Finally, ν_i depicts the unobserved time-invariant characteristics of region i (represents the regional fixed effects), ϕ_t denotes time-dummies (represents the time-period fixed effects), and ε_{it} is the disturbance term (idiosyncratic error). In other words, ν_i controls for all space-specific time-invariant variables, while ϕ_t controls for all time-specific space-invariant variables (Baltagi 2005).

The analysis uses fixed effects estimators controlling for time-invariant regional characteristics ν_i. It controls for the effects of the omitted variables that are peculiar to each region and accommodates regional heterogeneity (through ν_i). This estimator wipes out all the regional-specific time-invariant variables,[2] but a failure to account for these controls increases the risk that biased estimation results might be obtained. In addition, we calculate the p-values of the Breusch and Pagan's (1980) Lagrange Multiplier (LM) statistic, testing the validity of the pooled ordinary least square estimator. We therefore estimate a two-way error component model in which β_1 is the coefficient on the

[2] This implies that it is not possible to estimate the impact of ν_i on income inequality by fixed effects.

moderator (income per capita), β_2 and β_3 are the coefficients on the key independent variables (fiscal decentralisation, political decentralisation, respectively) and β_4 and β_5 are the coefficients of the two main control variables (trade openness and public sector size, respectively). β_6, β_7, β_8 and β_9 are coefficients on interaction terms of the independent variables with the moderator. Following the work by Brambor et al. (2006), we calculate the marginal effects of fiscal decentralisation ($\partial IncIneq / \partial FD = \beta_2 + \beta_6 IncPC$), political decentralisation ($\partial IncIneq / \partial PD = \beta_3 + \beta_7 IncPC$), trade openness ($\partial IncIneq / \partial TO = \beta_4 + \beta_8 IncPC$) and public sector size ($\partial IncIneq / \partial PS = \beta_5 + \beta_9 IncPC$) on income inequality which change across the observed range of regional per-capita income. We resort to a multiplicative interaction analysis because of its noticeable advantages with respect to alternative methods, such as comparing subgroup-based correlation coefficients. The latter type of analysis disregards the continuous nature of the development level moderator and has a lower explanatory capacity as the division into subgroups reduces the sample size (Dawson and Richter 2006).

In our model, we do not expect a non-linear relationship between per-capita income, our moderator, and income inequality for four reasons: (a) per-capita income is the moderator of the decentralisation-inequality relationship; (b) a large number of the relevant empirical studies which examine the relationship between economic development and income inequality focus not only on Western European countries, as our study, but also on less economically advanced countries (Rodríguez-Pose and Tselios 2009a); (c) the studies in question show that the declining segment of the Kuznets curve begins around 1970 (Nielsen and Alderson 1997; Rodríguez-Pose and Tselios 2009a); and (d) any non-linear relationship between two variables is likely to be the result of omitted variable bias (Greene 2003). A non-linear function is characterised by the fact that the change in income inequality for a given change in per-capita income depends on the starting value of per-capita income. However, the starting value of per-capita income may also depend on the fiscal and political decentralisation level. Therefore, we assume a linear

relationship between per-capita income and income inequality for developed countries (Western European countries) over a relatively limited period of time (1995-2000) (Rodríguez-Pose and Tselios 2009a).[3]

3.2 Data and variables

We use variables not only at regional, but also at a national level. *Regional variables* are based either on micro- or macro-data. Regional variables based on micro-data are extracted from the European Community Household Panel (ECHP) data survey,[4] while regional variables based on macro data stem from Eurostat's Regio dataset. The elaboration process of both datasets is coordinated by Eurostat, making comparisons reliable. *National variables* are extracted from the World Bank and the work by Hooghe et al. (2008). The resulting dataset includes data for 102 regions at NUTS I or II level from 13 countries in Western Europe between 1995 and 2000, the only years for which the ECHP is available (NUTS I: Austria, Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxemburg, Spain and Sweden; NUTS II: Portugal and the United Kingdom).

Within-region income inequality ($IncIneq_{il}$), the dependent variable, is calculated using the generalised Theil entropy index. For a region i with population N of individuals $\kappa \in \{1,2,...,N\}$, where each individual is associated with a unique value of the measured income, income inequality is defined as $IncIneq = \sum_{\kappa} y_{\kappa} \log(y_{\kappa} / p_{\kappa})$, where y_{κ} is the income share that is individual κ's total income as a proportion of the total income for the entire regional population N, and p_{κ} denotes population share. As the basic units are individuals, the population share is $1/N$. To check the robustness of the results, income inequality is also calculated using the Gini index, the squared coefficient of variation, and the Atkinson index. All these indices are expressed as a common form of income and

[3] We also test whether our conditional hypothesis is robust to the assumption of a non-linear relationship between per-capita income and income inequality.

[4] In the ECHP data survey, between 104,953 and 124,663 individuals were interviewed every year about their socioeconomic status and information was collected about their income, job, education status, living conditions, age, etc. (see Peracchi 2002). The ECHP has provided a rich microeconomic dataset that can be regionalised providing accurate data at the regional level and solving problems of comparability between countries. This survey is the only comparable longitudinal data source at European level.

population share. This means that if, for example, the regional population share is constant, inequality indices differ only because they employ different distance functions of the income ratios. Therefore, a change in income inequality for a region i from t to $t+\lambda$ is the result of a change in population income and share. This implies that the evolution of a region's contribution to change in regional inequality is determined by the change in both the region's income ratio and the region's population share.

Income inequality indices are measured using the microeconomic variable '*Total net personal income (detailed, national currency, total year prior to the survey)*' from the ECHP data survey.[5] We measure not only income inequality for the population as a whole, but also income inequality for normally working people which includes those working 15 hours per week or more. Wages and salaries are the main source of personal income as they constitute 45 percent of the personal income of the whole of the population and 78 percent of the personal income of normally working people, while the rest is income from self-employment or farming, pensions, unemployment and redundancy benefits, any other social benefits or grants, and private income (Rodríguez-Pose and Tselios 2009a).

The main moderator in the model is *per-capita income* ($IncPC_{it}$). For a region i with population N of individuals $\kappa \in \{1,2,...,N\}$, regional per-capita income is defined as $IncPC = \sum_{\kappa} y_{\kappa} p_{\kappa}$. This implies that per-capita income, as income inequality, depends on the income and population share (y_{κ} and p_{κ}). We use the ECHP data survey to measure regional per-capita income for the population as a whole and for normally working people. We use regional per-capita income, instead of regional per-capita GDP, for three reasons. First, GDP excludes transfers of income from individuals, companies and government in the form, for example, of social benefits (European Commission 1999). Second, because of the mismatch between political and administrative boundaries, on the one hand, and functional boundaries, on the other, the GDP per capita of many European small urban regions (e.g. Inner London, Brussels, Hamburg) is severely overstated, as a

[5] This variable has been adjusted to the same price level using the Harmonised Indices of Consumer Prices and has been converted into euros in order to make them comparable across countries and regions.

result of differences between where people work and where they live. Third, if a region does not spend but invests in other regions, its GDP will decline in comparison to a region that spends borrowed money.[6]

Fiscal and political decentralisation (FD_{st} and PD_{st}) depict the two main independent variables of our study. We use two proxies for the level of fiscal decentralisation (FD_{st}) of European countries: the subnational share in total government expenditure and the subnational share in total government revenue. The use of these indicators is not without controversy and they have come under strong criticism because the devolution of fiscal power from central to regional and local governments is a complex and multidimensional process (Martínez-Vázquez and McNab 2003; Schneider 2003; Rodríguez-Pose and Ezcurra 2010) which cannot be captured by a single indicator. Additionally, these indices do not capture the proportion of intergovernmental transfers that are discretionary or conditional (Ebel and Yilmaz 2002; Rodden 2004; Stegarescu 2005; Rodríguez-Pose and Ezcurra 2010). We use regional authority as our political decentralisation variable PD_{st} for European countries. It is defined by Hooghe *et al.* (2008) along the following lines: '*We conceive regional authority in two domains. Self-rule refers to the authority of a regional government over those living in the region. Shared-rule refers to the authority a regional government (co-)exercises in the country as a whole. Each is measured along eight dimensions or scales which describe institutional alternatives*'. More specifically, *self-rule* taps regional authority over institutional depth, policy making (economic, cultural-educational, and welfare), fiscal autonomy (in three areas of control: tax base, tax rate, and revenue split), and representation which denotes the capacity of regional actors to select regional office holders. *Shared-rule* includes law making, executive control, fiscal control, and constitutional reform. We also include a third domain of regional authority which represents the sum of the self-rule and shared-rule scores (the regional authority indicator, *RAI total*) (Hooghe *et al.* 2008). All these indicators have several advantages over rival indices (e.g. Lijphart 1999; Woldendorp *et al.* 2000; Schneider 2003; Brancati 2006), as they measure political decentralisation along a multitude of dimensions and allow for – admittedly limited – change over time.

[6] www.undp.org/hdr2001/ - United Nations Development Programme.

Trade openness (TO_{st}) for a European country s at time t is measured by the level of trade as a percentage of GDP (source: World Bank).

Public sector size (PS_{st}) for a European country s at time t is measured as total government expenditure as a percentage of GDP (source: World Bank).

In order to measure other *regional specific characteristics (x_{it})* we resort to the standard regional variables used in the literature (Berry and Glaeser 2005; Tselios 2008; Rodríguez-Pose and Tselios 2009a): educational endowment, unemployment, and sectoral composition. (a) Regional educational endowment is calculated using the microeconomic variable '*Highest level of general or higher education completed*' which is extracted from the ECHP data survey. Individuals are classified into three mutually-exclusive and comparable educational categories. We calculate the percentage of the population who have successfully achieved (i) less than second stage of secondary level education (which is our base category), (ii) second stage of secondary level education and (iii) recognised third level education. (b) Regional unemployment is measured as the percentage of unemployed respondents (self-defined). This variable is also extracted from the ECHP data survey. (c) The regional sectoral composition variables are extracted from the Eurostat database. We calculate (i) the added value per capita of agriculture, hunting, forestry and fishing (added value per capita of agricultural sector), (ii) the added value of mining and quarrying, manufacturing, electricity, gas and water supply, and construction (added value per capita of industrial sector), and (iii) the added value of services (excluding extra-territorial organizations and bodies) (added value per capita of service sector).

The means, standard deviation, and minimum and maximum value for the above variables are reported in Table 1. Income inequality within regions measured using the Theil index decreases slightly over the period of analysis, while per-capita income increases, both for the whole population and for normally working people. During the period of analysis fiscal decentralisation, proxied by the subnational share in total government expenditure, increased by 11.05 per cent, but proxied by the subnational share in total government revenue remained almost constant. Political decentralisation,

captured by the three domains of regional authority, increased. Finally, the moderator of trade openness also increased, while the moderator of public sector size remained almost constant.[7] As for the regional specific characteristics, citizens in Western Europe raised their educational attainment, regional unemployment declined, and the contribution of the service sector in the regional economy increased. Overall, the evolution of all regional and national variables between 1995 and 2000 shows limited change over time. Taking also into account that the fixed effects coefficients can be interpreted as short/medium-run or time-series effects, as they reflect within-region time-series variation (Mairesse 1990; Durlauf and Quah 1999), the business cycle is not expected to drive the estimated effects.

Insert Table 1 around here

4. Regression Results

The empirical analysis exploits the panel structure of the dataset for the 102 EU regions included in the analysis over the period 1995-2000. We also – following Brambor *et al*. (2006) – plot the marginal effects. Regressions 1-11 of Table 2 display the fixed effects results when the dependent variable is income inequality for the whole population measured using the Theil index. In all these regressions, the p-values of Breusch and Pagan's LM test strongly reject the validity of pooled OLS models and point to fixed effects models as the most appropriate. In addition, since there is not much difference between the significance of the homoskedasticity and the heteroscedasticity consistent covariance matrix estimator (White 1980), we report the homoskedastic results.[8] The standard errors are clustered at the country level. Finally, as the time-dummies in our econometric specification are statistically significant, we use a two-way error component model.

Insert Table 2 around here

Insert Figure 1 around here

[7] Appendix 1 shows the values of the national variables (fiscal and political decentralisation, trade openness and public sector size) for the 13 countries.
[8] The heteroskedastic results can be provided upon request.

Regression 1 indicates that greater fiscal decentralisation, proxied by the subnational share in total government expenditure, leads to a significant reduction of interpersonal income inequality within a region. This association is, however, strongly mediated by regional income per capita. The coefficient for $FD_{st}IncPC_{it}$ is positive, indicating that the reduction of income inequality linked to decentralisation declines as regional income per head increases. However, this explanation needs to be handled with care, as the coefficients of continuous interaction variables are difficult to interpret, and, as Brambor *et al*. (2006) indicate, this type of results can only throw limited light about the validity of our hypothesis (as they would only be correct if income were zero). We therefore calculate how the marginal effect of decentralisation changes across the observed range of regional per-capita income. This is presented in Figure 1a, where the solid sloping line denotes how the marginal effect of decentralisation on regional income inequality changes with regional economic development. Any particular point in this line is $\partial IncIneq / \partial FD = \beta_2 + \beta_6 IncPC$. The dotted lines on both sides of the solid line represent the 95% confidence intervals, which allow us to determine the conditions under which decentralisation has a statistically significant effect on income inequality.[9] Figure 1a corroborates the regression results: while greater fiscal decentralisation has contributed to a reduction of within-region interpersonal inequality, the relationship is moderated by the level of development of the region. As income rises, the capacity of fiscal decentralisation to contribute to a reduction in interpersonal inequality wanes. This implies that, while in less developed regions higher levels of fiscal decentralisation are associated with a decline in within regional interpersonal inequality, this association is lower in better-off regions. When fiscal decentralisation is measured by the subnational share in total government revenue, rather than expenditure, the results are similar (Regression 2 in Table 1 and Figure 1b). Hence, and in contrast to what could have been expected from the discussion in the theoretical section, the relationship between decentralisation and income inequality is negative for less developed European regions and this effect peters out as regional income rises. These results indicate that subnational governments may have indeed an information advantage over central governments to the

[9] Decentralisation has a statistically significant effect whenever the upper and lower bounds of the confidence interval are both above (or below) the zero line (Brambor *et al.* 2006: 76).

needs and preferences about local citizens, and local decision makers may respond better and more efficiently to the desires of their constituents over inequality (Tiebout 1956; Oates 1972; Ezcurra and Pascual 2008).

When we turn to the potential impact of political decentralisation on income inequality (Table 2, Regressions 3-5), the regression results show a negative coefficient on decentralisation for all proxies (*self-rule*, *shared-rule*, and *RAI-total*) and a positive coefficient on the interaction term of decentralisation with per-capita income, although the coefficients are only significant for *shared-rule*. This result is upheld by the figures showing the marginal effects (Figures 1c, 1d and 1e). They confirm that only when European regions exercise considerable authority in the country as a whole (*shared-rule*), greater political decentralisation will lead to a lowering of income inequality within regions, as both the upper and lower bounds of the confidence interval are below the zero line (Figure 1d). This is not the case in Figures 1c and 1e, indicating that overall political decentralisation and *self-rule*, or the capacity of regional governments to implement policies at the local level, do not have a significant impact on the evolution of interpersonal inequality. Therefore factors such as the influence of autonomous governments over national law-making, executive control, fiscal control and constitutional reform seem to foster equity, while more regional authority seems not to affect income distribution. As in the case of fiscal decentralisation, the decentralisation-inequality relationship for *shared-rule* is sensitive to the level of development of the region concerned: higher levels of decentralisation lead to a decline in interpersonal disparities at both low and high income regions, although the slope of the decline is greater for poorer than for richer regions.

The control variables included in the model are expected to have an influence over within region inequality levels. Income inequality can be affected not only by fiscal and political decentralisation, but also by trade openness and public sector size, as well as by unemployment, the sectoral structure of the region, and by the level of education of the population. Regressions 6 and 7 in Table 2 and Figures 1f and 1g examine the association between trade openness and public sector size, on the one hand, and income inequality, on the other, respectively, and whether these associations are moderated by regional

economic development. The results indicate that these associations are not as clear cut as could have been expected in theory. The marginal effect of trade openness (Figure 1f) and public sector size (Figure 1g) on within-region interpersonal income inequality is not statistically significant. Moreover, the regression coefficients on the regional controls highlight that a rise in the added value per capita of agriculture and industry is associated with a decrease in inequality, while the impact of services, tertiary education and unemployment is unclear (Table 2, Regressions 1-7).

Regressions 8-9 display the combined impact of fiscal and political decentralisation on interpersonal income inequality within regions. The results indicate that greater fiscal decentralisation – regardless of how it is measured – has contributed to a reduction of within-region interpersonal inequality, although, as income rises, its capacity to contribute to a reduction in interpersonal inequality wanes. By contrast, overall levels of political decentralisation (*RAI-total*) are irrelevant for the evolution of within region interpersonal inequality.

A fundamental issue encountered in exploring the association between decentralisation and inequality and the role of regional economic development in this relationship is connected to the size of the units of analysis. European regions vary enormously in population and it is therefore legitimate to ask whether larger regions should carry more weight than smaller ones. Sala-i-Martin (2003) has highlighted the relevance of using weights in analyses involving welfare and inequalities. Firebaugh (2003) has also argued that if the goal is to see how regional economies work – with each region viewed as a separate realisation of certain underlying economic processes – then each region should be weighted the same. Since fiscal and political decentralisation concern the welfare of people, government policies and the way regional economies work, we re-estimate the analysis using weighted regressions (Regressions 10-11). The use of population weights allows us to control for regional and national size, controlling for greater heterogeneity and for the possibility of larger local governments in bigger countries undertaking widely different policies than in smaller, more homogeneous, and compact regions and countries (Rodríguez-Pose and Ezcurra 2010). The regression results using weighted variables underline the robustness of our previous analysis. Once again, greater fiscal

decentralisation is associated with lower inequality, but as income rises, further decentralisation is connected to a lower decrease in inequality. It should be noted here that since the weighted variables contain some outliers. Omitting the outliers has virtually no effect on the results.

A further problem of our empirical specifications is the potential for reverse causality and endogeneity: a rise in interpersonal income inequalities at the local level may help trigger a greater decentralisation of public funds, giving local government more scope for redistributive policies, or vice versa. In order to address whether there is an endogeneity problem we resort to running the analysis using a generalised method of moments (GMM) estimation. GMM permits a certain degree of endogeneity in the regressors (Arellano and Bond 1991). In these dynamic regressions, the correlation between the explanatory variables and the error term is handled by instrumental variables. Regressions 12-15 display the Arellano and Bover (1995) and Blundell and Bond (1998) estimator. Both the weighted and unweighted results with an annual lagged dependent variable are displayed. The results further confirm the robustness of our initial estimations for fiscal decentralisation. Once again, greater fiscal decentralisation contributes to a reduction of within-region interpersonal inequality, and this contribution wanes as income rises. The results for political decentralisation (*RAI-total*) differ, however, from those of the static estimations. They show – more in agreement with theoretical expectations – that political decentralisation produces greater interpersonal inequality, but that this relationship declines as regional income per head rises.

We finally take into account the spatial aspects of the econometric specifications, as the potential presence of spatial dependence may indicate model misspecification.[10] The results of the Moran's I test (Cliff and Ord 1981) adapted to the estimated residuals of the fixed effects regression reject the null hypothesis of spatial dependence.[11] The Moran's I

[10] Our empirical strategy follows the specification searches and testing strategies of Anselin and Rey (1991) and Florax *et al*. (2003). We estimate a model without spatially lagged variable (spatially lagged income inequality), and, if the null hypothesis of no spatial correlation is rejected, we apply a remedial procedure, by adjusting the context of model specification (Anselin and Moreno 2003; Florax *et al.* 2003).

[11] The $k-$ nearest neighbours weights matrix has been used for k=5, 7 and 9. For example, Moran's I test for Regression 8 and for k=5 is 0.0828 and is not statistically significant, Although spatial dependence may matter for income inequality, controlling for national characteristics in our analysis contributes to limit

test is not used in the estimated residuals of the GMM regression results, as the explanatory variables are endogenous.

The territorial scale of the analysis (intra- versus inter-regional inequality) is crucial in the inequality-decentralisation relationship. If, for example, we assume that all rich people live in one jurisdiction and all poor people in another, intra-jurisdictional inequality will be zero, but inter-jurisdictional inequality and intrapersonal inequality for the total federation is high. However, this does not apply to the European case. Using the same data (ECHP) and multilevel decomposition of the Theil index of income inequality, Rodríguez-Pose and Tselios (2009b) have shown that 80 percent of the income inequality in Europe takes place among individuals living in the same region (intraregional inequalities), while 7 percent is between-region and within-country (interregional inequalities), and the rest (13 percent) is between-country inequality (international inequalities). We have further explored this issue by using data on interpersonal income inequality and income per capita within countries extracted from the same database (ECHP). The main argument of our study – that greater fiscal decentralisation is associated with lower interpersonal income inequality within regions, but as regional income rises, further decentralisation is connected to a lower decrease in inequality – also holds at the country level (see Appendix 2).[12] It should be noted here that the 'R-squared within' is higher than in Table 2. This is a symptom that national variables are key factors in explaining the relationship between inequality and decentralisation, as well as further proof that the within-region component accounts for the largest proportion of all European income inequality.

The above findings are also robust a) to changing the measure of inequality (the Gini index, the squared coefficient of variation and the Atkinson index), b) to the definition of income inequality (income inequality for normally working people) and c) to the inclusion of a squared term in per-capita income.[13]

its influence. In addition, the variance in-between regions – but within-country income inequality – is much lower (almost half) than the variance in-between countries income inequality.

[12] However, this result should be interpreted with some caution due to the low number of observations (70).

[13] These results are available from the authors upon request.

5. Concluding Remarks

This paper has been one of the first to explore the virtually untouched field of how fiscal and political decentralisation processes affect individuals rather than territories. By using regionally aggregated microeconomic data in order to measure the level of interpersonal inequality for the regions of Europe, we have been able to address whether decentralisation matters for the evolution of within regional interpersonal inequality and whether this relationship is mediated by the level of development of the region.

The results highlight that the influence of decentralisation on interpersonal inequality is much stronger than expected. In contrast with a theoretical field that had little to say about this topic and where predictions about the direction of the relationship between both factors were uncertain, the results of our multiplicative interaction regression analysis unequivocally point to the fact that greater fiscal decentralisation in Europe is associated with lower income inequality within regions. They also suggest that this relationship is highly influenced by the level of wealth of the region to which authority and funds are being decentralised. However, the sign of the relationship counters most theoretical predictions. Against the views that worse-off regions would be disadvantaged because of capacity and funding constraints, which could prevent them from effectively implementing policies which could reduce interpersonal inequality, it is precisely these less well-off regions which seem to be benefiting the most from the inequality-reducing effects of fiscal decentralisation processes. As income rises, the association declines.

Political decentralisation, in contrast, seems to have a weaker connection with income inequality. The political powers of regions and their capacity to influence national policies do not seem to affect the evolution of intraregional income inequalities. If anything, the results of the dynamic analysis point in an opposite direction to the effect found for fiscal decentralisation: greater political decentralisation may lead to a marginal increase in interregional inequalities, but this effect wanes as the income per capita of the region rises.

Although given the exploratory nature of the analysis, the results should be considered with caution, especially due to the short time-series available, the analysis opens new

avenues for research about the potential economic implications of decentralisation. In contrast to the studies which have focused on aggregate outcomes about the impact of greater level of autonomy on aggregate growth and on interterritorial disparities, the focus on the impact of decentralisation in income distribution creates a much richer and potentially much more useful field for the study of the implications of changing the scales at which policies are implemented. If decentralisation is all about delivering better policies to individuals, looking precisely at those individuals may offer a more accurate evaluation of its outcomes.

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Table 1: Descriptive analysis

	Variable	Year	Obs	Mean	Std. Dev.	Min	Max
Dependent variable	Income inequality (Theil index) for the whole population	1995	94	0.4162	0.1571	0.1750	0.8296
		2000	102	0.3602	0.1365	0.1057	0.7368
	Income inequality (Theil index) for normally working people	1995	94	0.2421	0.0754	0.1263	0.4902
		2000	102	0.2142	0.0708	0.0569	0.4099
Moderator	Income per capita (/1000) for the whole population	1995	94	9.7638	3.5351	3.4003	18.9265
		2000	102	12.8134	4.5534	4.0543	21.1400
	Income per capita (/1000) for normally working people	1995	94	13.1867	4.3246	4.9414	28.4248
		2000	102	16.6180	5.2058	5.8032	29.3148
Independent variable	Fiscal decentralisation (exp)	1995	98	0.2435	0.0774	0.0927	0.4540
		2000	98	0.2704	0.0933	0.1084	0.4668
	Fiscal decentralisation (rev)	1995	98	0.2777	0.0838	0.1139	0.4614
		2000	98	0.2746	0.0905	0.1244	0.4603
	Political decentralisation (self-rule)	1995	102	12.9137	5.2234	0	22
		2000	102	13.0824	5.5139	0	22
	Political decentralisation (shared-rule)	1995	102	2.0990	3.3044	0	9
		2000	102	2.2284	3.2298	0	9
	Political decentralisation (RAI total)	1995	102	15.0128	7.9867	0	29.2
		2000	102	15.3431	8.0791	0	29.2
	Trade openness	1995	102	58.7465	22.1864	43.6400	191.5760
		2000	102	69.8551	31.2254	53.1757	278.9909
	Public sector size	1995	102	20.0143	2.6600	15.4509	26.6144
		2000	102	19.6564	2.4374	13.8081	26.0055
Control variable	Primary	1995	94	0.5360	0.1734	0.1444	0.9026
		2000	102	0.4554	0.1759	0.1151	0.8595
	Secondary	1995	94	0.2729	0.1658	0.0725	0.6334
		2000	102	0.2844	0.1835	0.0798	0.6823
	Tertiary	1995	94	0.1911	0.1066	0.0180	0.4094
		2000	102	0.2603	0.1502	0.0358	0.5556
	Unemployment	1995	94	0.0580	0.0329	0	0.1654
		2000	102	0.0446	0.0280	0.0059	0.1485
	Agriculture	1995	101	0.4413	0.3202	0.0108	1.4235
		2000	97	0.4417	0.3284	0.0073	1.4441
	Industry	1995	101	4.3274	1.7705	0.8403	9.2803
		2000	97	5.6157	1.9288	1.3328	10.4844
	Services	1995	101	10.0483	5.0555	3.6392	33.7703
		2000	97	14.4104	5.9178	5.1171	38.7076

Table 2: Dependent variable is income inequality for the whole population

	Fixed effects estimator						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Income per capita	-0.0203	-0.0191	0.0080	0.0142	0.0069	0.0095	0.0223
	(0.0057)***	(0.0080)**	(0.0107)	(0.0032)***	(0.0084)	(0.0085)	(0.0301)
Fiscal decentralisation (exp)	-1.9969						
	(0.3279)***						
Interaction: Income per capita x Fiscal decentralisation (exp)	0.1470						
	(0.0198)***						
Fiscal decentralisation (rev)		-2.1419					
		(0.4941)***					
Interaction: Income per capita x Fiscal decentralisation (rev)		0.1322					
		(0.0217)***					
Political decentralisation (self-rule)			-0.0100				
			(0.0129)				
Interaction: Income per capita x Political decentralisation (self-rule)			0.0008				
			(0.0010)				
Political decentralisation (shared-rule)				-0.0616			
				(0.0232)**			
Interaction: Income per capita x Political decentralisation (shared-rule)				0.0031			
				(0.0013)**			
Political decentralisation (RAI total)					-0.0103		
					(0.0090)		
Interaction: Income per capita x Political decentralisation (RAI total)					0.0008		
					(0.0007)		
Trade openness						-0.0019	
						(0.0027)	
Interaction: Income per capita x Trade openness						0.0001	
						(0.0001)	
Public sector size							-0.0107
							(0.0169)
Interaction: Income per capita x Public sector size							-0.0003
							(0.0015)
Secondary (base: primary)	-0.0314	-0.0314	-0.0149	-0.0360	-0.0203	-0.0237	0.0111
	(0.0255)	(0.0197)	(0.0407)	(0.0292)	(0.0341)	(0.0339)	(0.0337)
Tertiary	-0.0283	-0.0821	-0.0330	-0.0091	-0.0276	-0.0367	-0.0628
	(0.0203)	(0.0341)**	(0.0321)	(0.0389)	(0.0321)	(0.0471)	(0.0354)
Unemployment	0.2315	0.2625	0.2530	0.3410	0.2715	0.1889	0.2894
	(0.1486)	(0.1756)	(0.2609)	(0.2498)	(0.2638)	(0.1715)	(0.2487)
Agriculture	-0.0074	-0.0410	-0.0632	-0.0716	-0.0633	-0.0608	-0.0565
	(0.0434)	(0.0395)	(0.0312)*	(0.0370)*	(0.0334)*	(0.0377)	(0.0256)**
Industry	-0.0174	-0.0205	-0.0194	-0.0174	-0.0181	-0.0200	-0.0253
	(0.0056)**	(0.0061)***	(0.0075)**	(0.0071)**	(0.0073)**	(0.0078)**	(0.0070)***
Services	0.0012	0.0019	0.0009	0.0012	0.0011	-0.0022	0.0005
	(0.0014)	(0.0012)	(0.0019)	(0.0015)	(0.0020)	(0.0025)	(0.0016)
Time-dummies	YES	YES	YES	YES	YES	YES	YES
Constant	0.7697	0.8875	0.4437	0.4017	0.4476	0.4804	0.5815
	(0.0574)***	(0.1310)***	(0.1243)***	(0.0464)***	(0.0955)***	(0.1706)**	(0.3284)
Observations	566	566	586	586	586	586	586
R-squared within	0.3621	0.3432	0.2763	0.2930	0.2819	0.2850	0.2867
LM test	519.45	521.46	578.75	634.61	586.40	639.47	616.00
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

*** p<0.01, ** p<0.05, * p<0.1

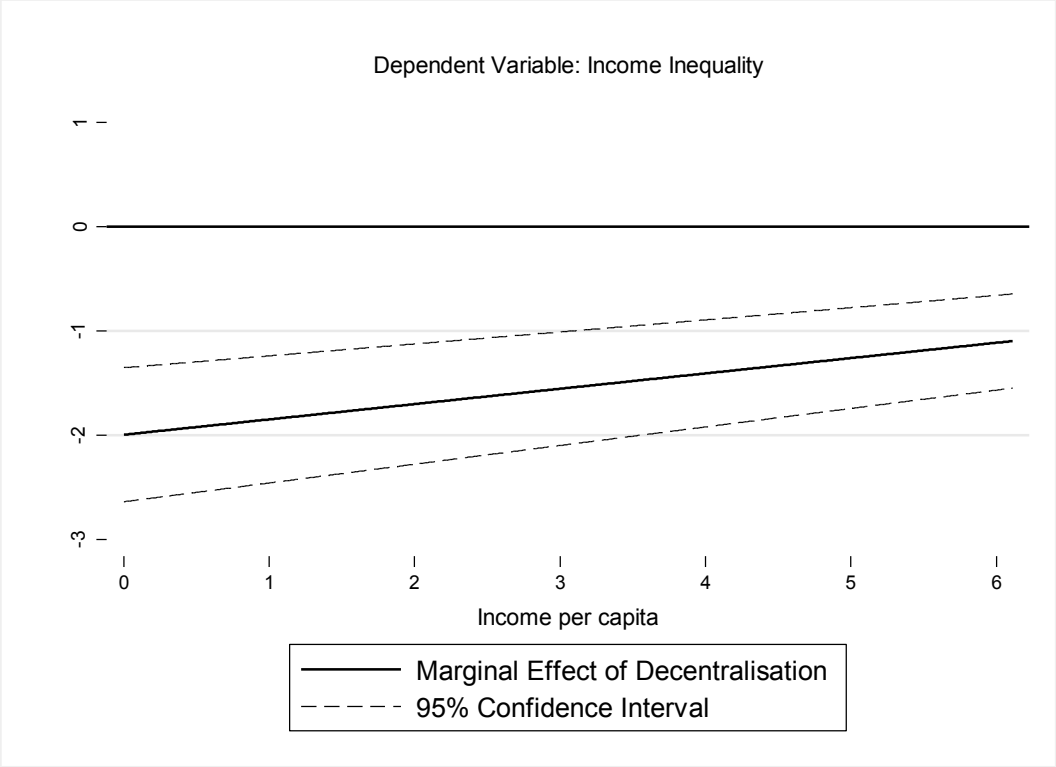
Table 2 (cont.): Dependent variable is income inequality for the whole population

	Fixed effects estimator				GMM estimator			
			Weighted				Weighted	
	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Income per capita	0.0338	0.0162	0.0157	0.0130	-0.0061	-0.0097	0.0021	0.0020
	(0.0293)	(0.0351)	(0.0017)***	(0.0025)***	(0.0081)	(0.0087)	(0.0007)***	(0.0007)***
Fiscal decentralisation (exp)	-2.0669		-0.8037		-0.2860		-0.1436	
	(0.4451)***		(0.3456)**		(0.1309)**		(0.0516)***	
Interaction: Income per capita x Fiscal decentralisation (exp)	0.1696		0.0229		0.0178		0.0074	
	(0.0371)***		(0.0110)*		(0.0103)*		(0.0027)***	
Fiscal decentralisation (rev)		-2.0712		-0.8005		-0.2391		-0.1145
		(0.5065)***		(0.3603)**		(0.1421)*		(0.0369)***
Interaction: Income per capita x Fiscal decentralisation (rev)		0.1507		0.0186		0.0137		0.0058
		(0.0400)***		(0.0125)		(0.0120)		(0.0015)***
Political decentralisation (RAI total)	-0.0009	-0.0003	0.0019	0.0011	0.0038	0.0032	0.0018	0.0016
	(0.0081)	(0.0080)	(0.0016)	(0.0015)	(0.0017)**	(0.0018)*	(0.0004)***	(0.0003)***
Interaction: Income per capita x Political decentralisation (RAI total)	0.0003	0.0003	-0.0000	0.0000	-0.0002	-0.0002	-0.0001	-0.0001
	(0.0006)	(0.0006)	(0.0000)	(0.0000)	(0.0001)*	(0.0001)	(0.0000)***	(0.0000)***
Trade openness	-0.0012	-0.0013	0.0008	0.0006	0.0003	0.0003	0.0002	0.0002
	(0.0025)	(0.0027)	(0.0009)	(0.0010)	(0.0003)	(0.0003)	(0.0001)**	(0.0001
Interaction: Income per capita x Trade openness	0.0001	0.0001	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
	(0.0001)	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)*	(0.0000
Public sector size	0.0261	0.0167	-0.0002	0.0004	-0.0088	-0.0114	-0.0007	-0.000
	(0.0138)*	(0.0144)	(0.0071)	(0.0062)	(0.0055)	(0.0059)*	(0.0005)	(0.0003
Interaction: Income per capita x Public sector size	-0.0033	-0.0023	-0.0003	-0.0003	0.0005	0.0007	-0.0000	-0.0000
	(0.0013)**	(0.0015)	(0.0002)	(0.0002)	(0.0004)	(0.0004)	(0.0000)	(0.0000)
Secondary (base: primary)	-0.0512	-0.0436	0.0170	-0.0057	-0.0415	-0.0364	-0.0337	-0.0374
	(0.0327)	(0.0325)	(0.0281)	(0.0322)	(0.0224)*	(0.0233)	(0.0171)*	(0.0164
Tertiary	-0.0680	-0.0891	-0.0240	-0.0522	-0.0668	-0.0691	-0.0404	-0.044
	(0.0276)**	(0.0488)*	(0.0469)	(0.0560)	(0.0286)**	(0.0277)**	(0.0244)	(0.023
Unemployment	0.2253	0.2717	0.2469	0.2558	0.1283	0.1199	0.1119	0.109
	(0.1177)*	(0.1604)	(0.1889)	(0.2224)	(0.0836)	(0.0846)	(0.0716)	(0.071
Agriculture	-0.0194	-0.0516	-0.0598	-0.0685	-0.0024	-0.0034	-0.0009	-0.000
	(0.0428)	(0.0344)	(0.0337)	(0.0287)**	(0.0072)	(0.0075)	(0.0055)	(0.005
Industry	-0.0178	-0.0205	-0.0123	-0.0129	-0.0021	-0.0023	-0.0021	-0.002
	(0.0056)***	(0.0068)**	(0.0091)	(0.0077)	(0.0017)	(0.0017)	(0.0014)	(0.001
Services	-0.0009	-0.0003	-0.0025	-0.0024	0.0001	-0.0001	-0.0000	0.000
	(0.0016)	(0.0016)	(0.0026)	(0.0029)	(0.0005)	(0.0006)	(0.0004)	(0.000
Lagged income inequality					0.8644	0.8682	0.8886	0.8880
					(0.0257)***	(0.0248)***	(0.0223)***	(0.0218)***
Time-dummies	YES	YES	YES	YES	YES	YES	YES	YES
Constant	0.3971	0.6247	0.4822	0.5393	0.2027	0.2569	0.0469	0.0503
	(0.3856)	(0.4556)	(0.0870)***	(0.1045)***	(0.1226)	(0.1306)*	(0.0184)**	(0.0179)***
Observations	566	566	566	566	477	477	477	477
R-squared within	0.3877	0.3610	0.2945	0.2876				
LM test	607.13	312.39	496.17	479.54				
	(0.000)	(0.000)	(0.000)	(0.000)				
AR(1) test					-4.71	-4.71	-4.63	-4.59
					(0.000)	(0.000)	(0.000)	(0.000)
AR(2) test					-0.89	-0.88	-1.06	-1.06
					(0.373)	(0.380)	(0.290)	(0.290)
Sargan test					327.19	323.88	324.44	321.52
					(0.003)	(0.004)	(0.045)	(0.057)

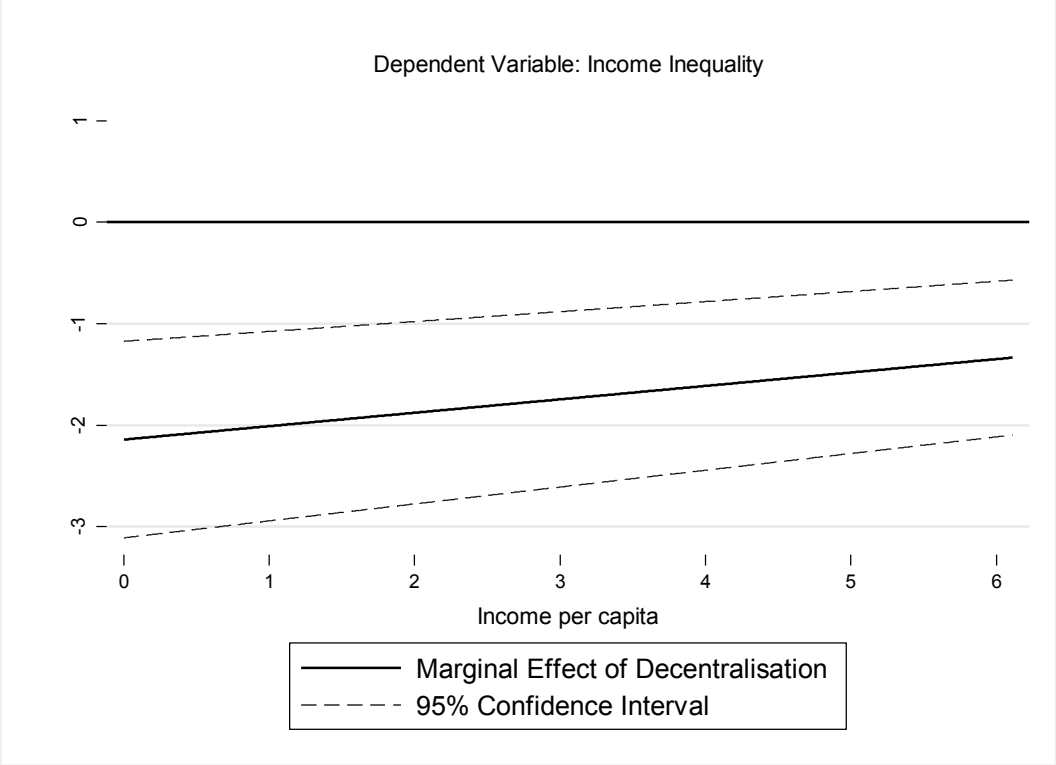
*** p<0.01, ** p<0.05, * p<0.1

Figure 1: Marginal effects

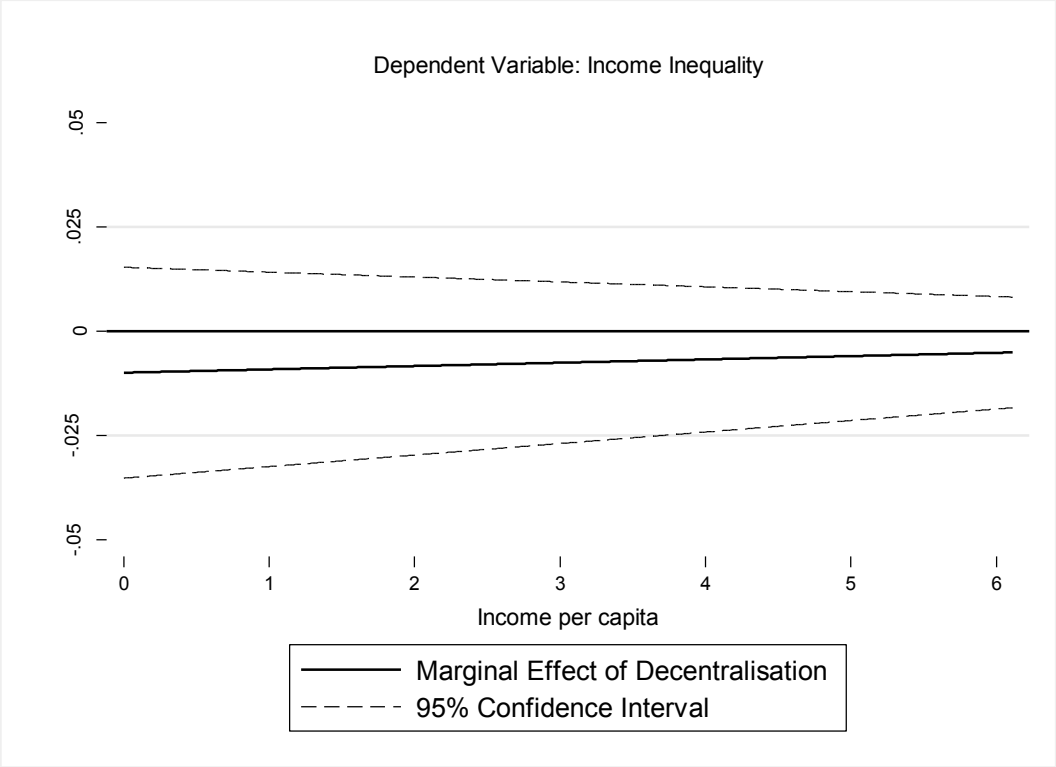
1a: Regression 1 (Fiscal decentralisation, expenditure)



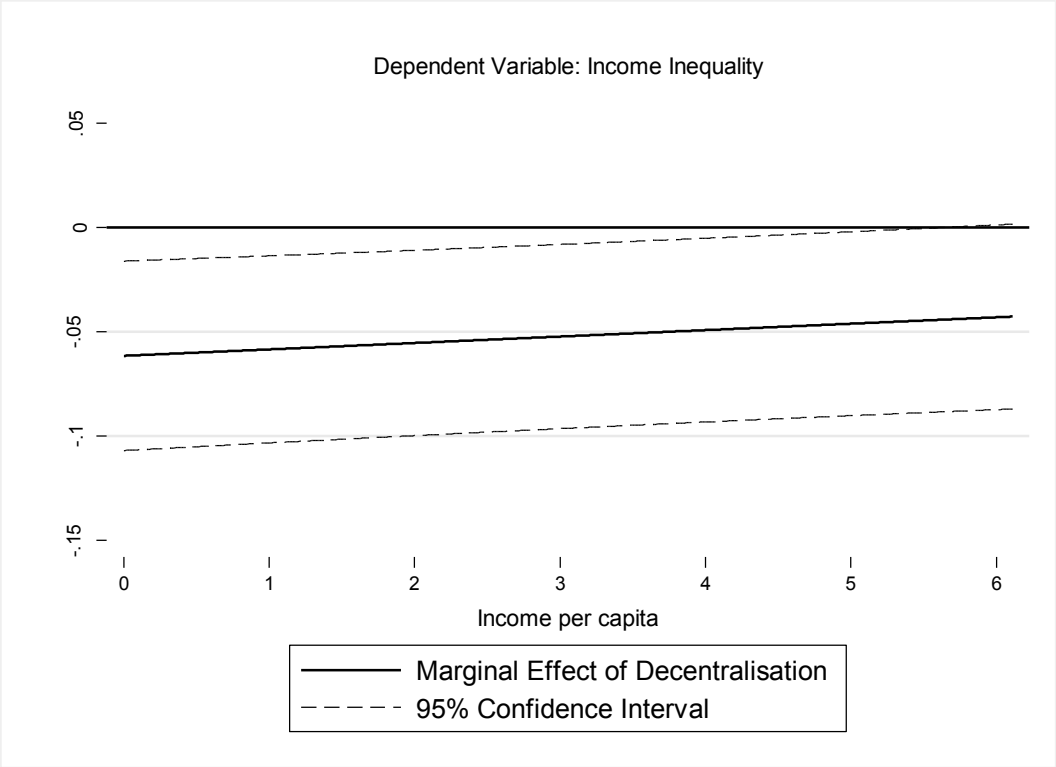
1b: Regression 2 (Fiscal decentralisation, revenue)



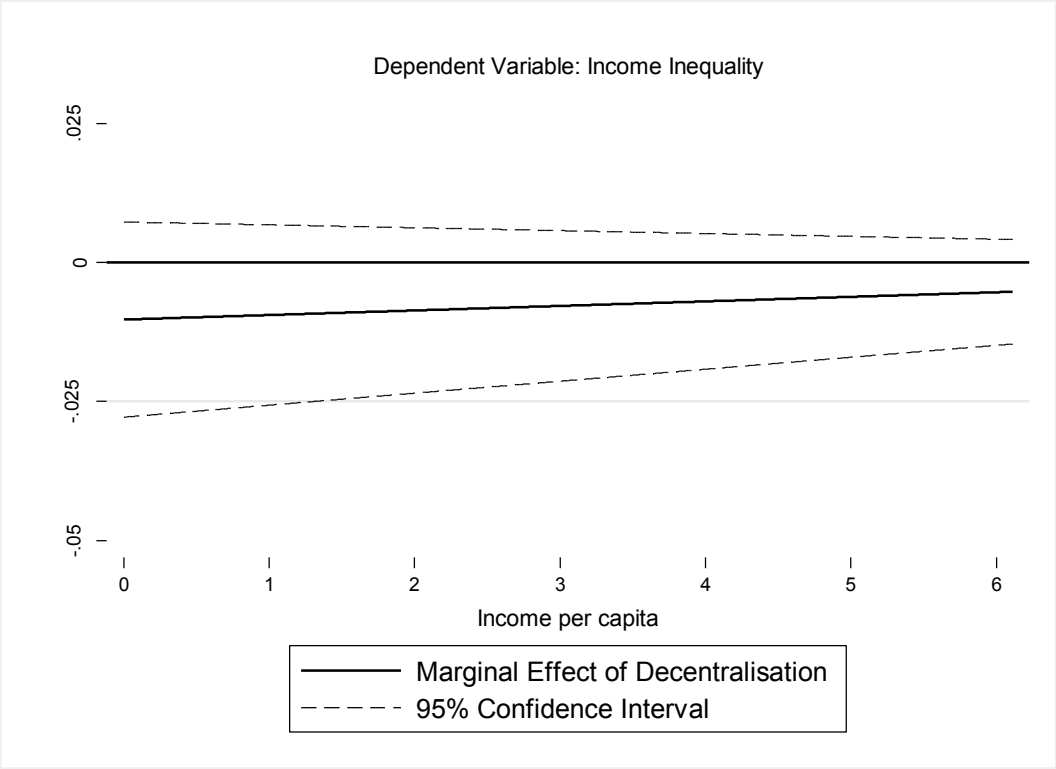
1c: Regression 3 (Political decentralisation, self-rule)



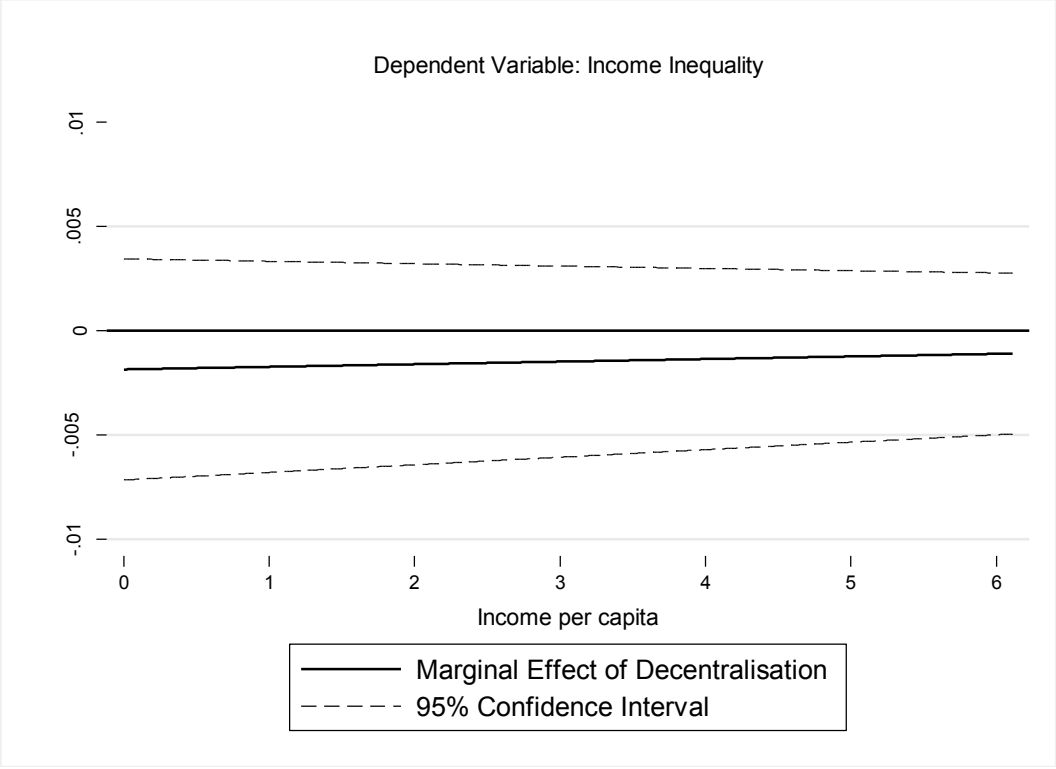
1d: Regression 4 (Political decentralization, shared-rule)



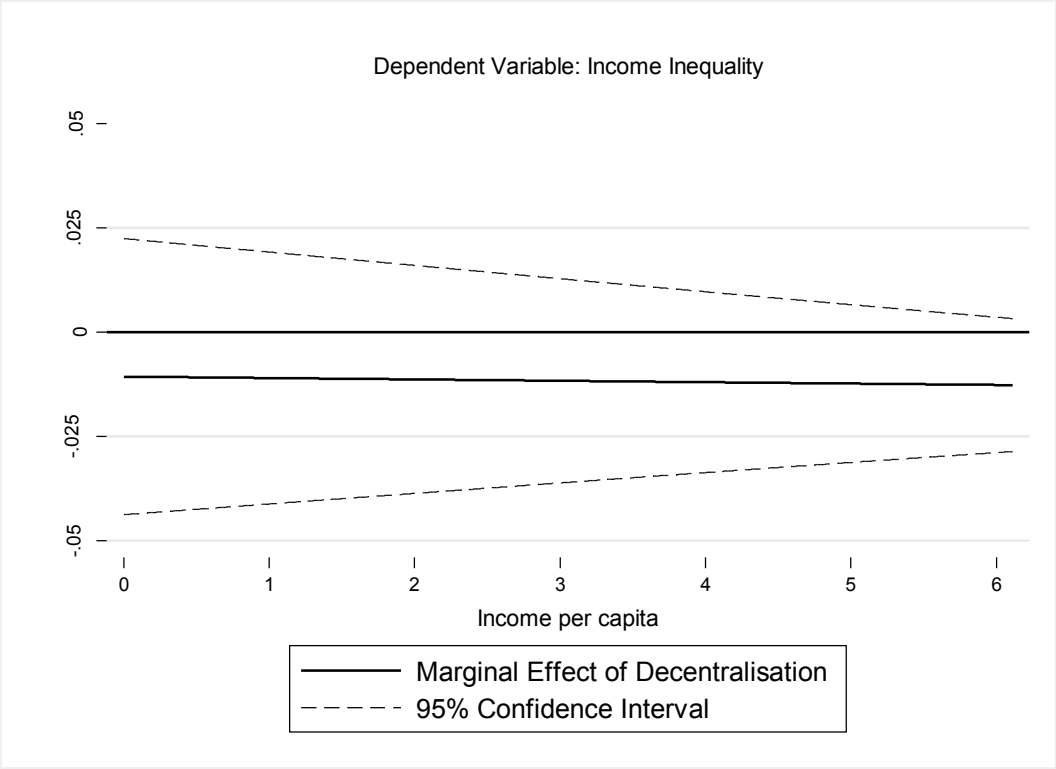
1e: Regression 5 (Political decentralization, RAI)



1f: Regression 6 (Trade openness)



1g: Regression 7 (Public sector size)



Appendix 1: Values of national variables by country

Country	Year	Fiscal decentr. (exp)	Fiscal decentr. (rev)	Political decentr. (self-rule)	Political decentr. (shared-rule)	Political decentr. (RAI total)	Trade openness	Public sector size
AUSTRIA	1995	0.2984	0.3299	12.0	6.0	18.0	70.4181	20.0913
BELGIUM	1995	0.3033	0.3167	22.0	7.0	29.0	131.2467	21.5408
DENMARK	1995	0.4540	0.4614	10.1	0.1	10.2	71.1857	25.2254
FRANCE	1995	0.1697	0.1864	16.0	0.0	16.0	44.4107	23.6875
GERMANY	1995	0.3547	0.3993	20.2	9.0	29.2	47.4403	19.5742
IRELAND	1995	0.2340	0.2668	6.0	0.0	6.0	140.6212	16.3139
ITALY	1995	0.2048	0.2427	16.2	1.3	17.5	47.6728	17.9609
LUXEMBOURG	1995	0.1230	0.1336	0.0	0.0	0.0	191.5760	15.9096
PORTUGAL	1995	0.0927	0.1139	3.3	0.2	3.5	63.6079	17.8529
SPAIN	1995	0.2795	0.3230	18.2	3.0	21.2	44.7663	18.0830
SWEDEN	1995	0.3308	0.3776	10.0	0.0	10.0	72.7369	26.6144
UK	1995	0.2142	0.2480	9.8	0.1	9.9	56.8911	19.7624
GREECE	1995			9.0	0.0	9.0	43.6400	15.4509
AUSTRIA	2000	0.3173	0.3347	12.0	6.0	18.0	89.4929	18.3705
BELGIUM	2000	0.3090	0.3111	22.0	7.0	29.0	166.3527	21.3227
DENMARK	2000	0.4668	0.4603	10.1	0.1	10.2	87.1529	25.1243
FRANCE	2000	0.1669	0.1871	16.0	0.0	16.0	56.2274	22.9002
GERMANY	2000	0.3956	0.4036	20.2	9.0	29.2	66.4015	19.0017
IRELAND	2000	0.2677	0.2695	6.0	0.0	6.0	183.1218	13.8081
ITALY	2000	0.2530	0.2724	18.2	1.3	19.5	53.1757	18.4481
LUXEMBOURG	2000	0.1180	0.1244	0.0	0.0	0.0	278.9909	15.1000
PORTUGAL	2000	0.1084	0.1266	3.5	0.2	3.7	70.4073	19.3204
SPAIN	2000	0.3442	0.3580	19.1	3.0	22.1	61.1964	17.1928
SWEDEN	2000	0.4053	0.3831	10.0	0.0	10.0	86.8859	26.0054
UK	2000	0.2213	0.2155	9.3	0.5	9.9	57.8316	18.9639
GREECE	2000			10.0	0.0	10.0	63.2216	17.8095
AUSTRIA	1995-2000	0.3104	0.3367	12.0	6.0	18.0	79.5447	19.1776
BELGIUM	1995-2000	0.3060	0.3158	22.0	7.0	29.0	144.6451	21.5256
DENMARK	1995-2000	0.4619	0.4529	10.1	0.1	10.2	75.6948	25.3467
FRANCE	1995-2000	0.1681	0.1853	16.0	0.0	16.0	49.0231	23.4391
GERMANY	1995-2000	0.3903	0.4027	20.2	9.0	29.2	55.0519	19.3630
IRELAND	1995-2000	0.2461	0.2643	6.0	0.0	6.0	156.2111	14.7584
ITALY	1995-2000	0.2292	0.2514	17.5	1.3	18.8	47.7688	18.2206
LUXEMBOURG	1995-2000	0.1200	0.1293	0.0	0.0	0.0	230.8233	15.8976
PORTUGAL	1995-2000	0.0996	0.1255	3.4	0.2	3.6	65.8937	18.3906
SPAIN	1995-2000	0.3104	0.3413	18.8	3.0	21.8	52.1945	17.5378
SWEDEN	1995-2000	0.3729	0.3701	10.0	0.0	10.0	77.7299	26.7523
UK	1995-2000	0.2166	0.2287	7.1	0.2	7.4	56.5796	18.8608
GREECE	1995-2000			9.7	0.0	9.7	50.4910	15.6910

Appendix 2: Dependent variable is national income inequality for the whole population

	Fixed effects estimator	
	(1)	(2)
National income per capita	-0.0253	-0.0404
	(0.0244)	(0.0253)
Fiscal decentralisation (exp)	-1.6097	
	(0.5554)***	
Interaction: National income per capita	0.1306	
x Fiscal decentralisation (exp)	(0.0423)***	
Fiscal decentralisation (rev)		-1.7860
		(0.6309)***
Interaction: National income per capita		0.1196
x Fiscal decentralisation (rev)		(0.0540)**
Political decentralisation (RAI total)	-0.0197	-0.0186
	(0.0072)***	(0.0072)**
Interaction: National income per capita	0.0016	0.0016
x Political decentralisation (RAI total)	(0.0005)***	(0.0005)***
Trade openness	-0.0032	-0.0038
	(0.0018)*	(0.0017)**
Interaction: National income per capita	0.0001	0.0002
x Trade openness	(0.0001)	(0.0001)**
Public sector size	0.0087	0.0013
	(0.0159)	(0.0176)
Interaction: National income per capita	-0.0014	-0.0007
x Public sector size	(0.0013)	(0.0014)
Secondary (base: primary)	0.0074	0.0194
	(0.0615)	(0.0613)
Tertiary	0.0288	0.0150
	(0.0813)	(0.0859)
Unemployment	0.9785	1.0401
	(0.3896)**	(0.3863)**
Agriculture	-0.0224	-0.0722
	(0.0838)	(0.0862)
Industry	0.0004	0.0002
	(0.0072)	(0.0076)
Services	0.0014	0.0008
	(0.0054)	(0.0055)
Time-dummies	YES	YES
Constant	0.9311	1.2410
	(0.3235)***	(0.3496)***
Observations	70	70
R-squared within	0.8118	0.8057
LM test	1.21	1.13
	(0.2710)	(0.2868)

*** p<0.01, ** p<0.05, * p<0.1